ED 383 853   CE 069 162

AUTHOR   Neumann, George R.; And Others
TITLE   The Benefits and Costs of National Service: Methods
                for Benefit Assessment with Application to Three
                AmeriCorps Programs.
SPONS AGENCY   Charles A. Dana Foundation, New York, NY.; IBM
                Foundation.; James G. Irvine Foundation, San
                Francisco, CA.; Youth Service America, Washington,
                DC.
PUB DATE   95
NOTE   78p.
PUB TYPE   Reports - Evaluative/Feasibility (142)

EDRS PRICE   MF01/PC04 Plus Postage.
DESCRIPTORS   Adult Education; Adult Literacy; Citizenship
                Responsibility; Computer Literacy; Conservation
                (Environment); *Cost Effectiveness; Federal
                Legislation; Literacy Education; National Programs;
                *Program Effectiveness; 'Public Service
IDENTIFIERS   AmeriCorps; *Corporation for National Service

ABSTRACT
        A study applied the principles of benefit-cost
analysis to three prototype grants programs of AmeriCorps: AmeriCorps
for Math and Literacy, Project First, and the East Bay Conservation
Corps. It studied the methods these projects used and estimated the
benefits using data from projects similar in approach and
implementation. Benefits received by AmeriCorps members were as
follows: a stipend payment; fringe benefits; a charitable
contribution value due to performing public service; and value of
future education benefits received through the education voucher
system. Representative benefits to society from the three programs
included the following: increased future earnings of participants,
reduced crime and consequent reduced social costs, the general
benefits that accompany better informed citizens, increased General
Educational Development pass rate, and consumer surplus. The nature
of the AmeriCorps program made it difficult to measure costs
attributable to the program since the 25 percent match of program
operating costs often came in the form of donated services. The
benefit-cost ratio calculated the present value of the aggregate net
expected benefits accruing to society, to AmeriCorps members, and to
donors relative to the costs in terms of the present value of federal
dollars expended. Benefits were measured to be $1.60 to $2.60 per
dollar of federal outlay. (Appendixes contain 24 references, 8
tables, and authors' resumes.) (YLB)

The Benefits and Costs of National Service

Methods for Benefit Assessment with Application to Three AmeriCorps Programs

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The Benefits and Costs of National Service

Methods for Benefit Assessment with
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I.   Introduction.

The National and Community Service Act of 1990, as amended, created the Corporation for National Service (CNS) to provide opportunities for service to the nation. The mission of CNS is to:

> "...engage Americans of all ages and backgrounds in community-based service. This service will address the nation's education, human, public safety, and environmental needs to achieve direct and demonstrable results. In doing so, the Corporation will foster civic responsibility, strengthen the cords that bind us together as a people, and provide educational opportunity for those who make a substantial commitment to service."

AmeriCorps is the central new initiative used by CNS to provide the community-based service. Local, state, and national organizations compete for funds to provide needed services, and federal money is used to leverage funds, resources and other assistance donated by sponsors and uncompensated volunteers. In 1994 the grants budget for AmeriCorps was $155 million, and in 1995 it is $250 million.

In the context of ongoing budget deliberations, it is reasonable to ask what returns or benefits accrue to society as a   s   of this program. As is usually the case, while costs are relatively easy to understand and measure, benefits typically occur in the future, are of uncertain magnitude, and frequently are difficult to measure. This is especially so in a case where, as here, the national effort has been in operation for

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less than a year.[1] Because of the short time of operation, the data that would be needed to evaluate each of the ongoing programs are not available.[2] Moreover, while all AmeriCorps programs are focused on similar goals, the methods chosen to attain those goals are diverse and locally determined, which requires an individualized examination of benefits in each separate program.

These problems notwithstanding, we conclude that: (a) there are important measurable benefits to individuals and society from the AmeriCorps program; (b) these benefits can be measured using scientific methods and the best available information; (c) the benefits that are scientifically measurable are substantially in excess of the program's costs; and, (d) the measurable benefits underestimate the total benefits to individuals and society from the AmeriCorps program.

In the methodology that we present, some benefits necessarily go uncounted, and some are almost certainly undervalued. We have generally tried to be conservative in the application of our methodology. Especially when benefits are difficult to measure, policy makers should have an objective basis for decision-making on such programs.

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[1] AmeriCorps programs typically began operation in September of 1994, with many programs not beginning until January of 1995.

[2] This is not unusual in the area of social programs. Comprehensive evaluation of the effects of pre-school intervention for at-risk children in the Perry Pre-School Project were not available until 13 years after the project ended. See Barnett [1992].

We believe that the methodology developed in this study is well-suited for this purpose.

To provide measurements of the expected benefits of AmeriCorps programs we focus on three specific programs - AmeriCorps for Math and Literacy, operating in Austin, Texas and Columbus, Ohio; Project First, operating in Atlanta, Georgia, Charlotte, North Carolina, and New York City; and the East Bay Conservation Corps, operating in Oakland, California. We have studied the methods that these projects use and we have estimated the benefits of each project using data from projects that are similar in approach and implementation.

In this study we measure the benefits that we <u>can</u> measure, but we are aware that some benefits are by their nature very hard to evaluate, or have not been evaluated before and thus we lack a basis for measurement. For example, several AmeriCorps projects attempt to reduce racial tensions, which, to the extent they are successful, would be regarded as beneficial by most persons. But how beneficial is a difficult question to answer and we have not found independent expressions of willingness to pay for these benefits. This does not mean that we can not evaluate programs such as AmeriCorps. It suggests, however, that the full benefit-cost ratio will generally exceed that which can be calculated.

In calculating benefit-cost ratios we attempt to provide a meaningful picture of the economic choices that are involved. This means, for example, that we measure the marginal benefits and marginal costs that follow from a project's operation. In particular, we allow for various sorts of "leakages" in the delivery of benefits. For example, not all of the education vouchers will be used to obtain additional education; some will be used to pay off existing college loans, making it a benefit to AmeriCorps members, but not otherwise leading to increased investment. Similarly, matching fund requirements for service projects may not result in a dollar-for-dollar increase in spending. Some "fiscal" substitution -- whereby funds that would have been used for this purpose are substituted for other purposes, including local tax relief -- generally occurs, and we have specifically allowed for it.

After making allowance for these effects, we still find significant benefits arising from the AmeriCorps programs. To preview our results, we find that AmeriCorps programs of the sort that we examine in this report have favorable benefit-cost ratios. That is, while we are sure that we have not measured all benefits that flow from these programs, the benefits that we can measure substantially exceed federal costs and sponsor matching grants. Similarly, the costs that we do measure probably overstate the true costs of running these programs in part because donated services over state true costs. Even after allowing for substitution in the provision of these benefits, an accounting that is appropriate yet seldom done in these cost-benefit studies, we still find benefit-cost ratios in the range of 160 - 260%, at a minimum. In other words,

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after taking a more conservative approach than most such studies, we find a substantial positive return on the national service investment.

Our methodology must be contrasted to that of enthusiastic lay proponents of particular programs who often will assert "benefit-cost ratios" of a favored project on the order of 5-to-1, 10-to-: and even 100-to-1 or more. Such statements are at best based upon partial or conditional methods. For example, a compensatory education program may cost $700 annually per student and a successful individual case may eliminate the need to repeat a grade at a cost of $5,600. The benefit-cost ratio might then be reported as 8-to-1, without stating that it is conditional upon the successful intervention. In fact, if the success rate were only one in ten and the benefits would accrue over a five-year horizon, the true benefits could be less than 75 cents on the dollar.

II. Overview of the AmeriCorps Program.

The cornerstone of the CNS national service program is AmeriCorps. Although there are three distinct programs contained in AmeriCorps –AmeriCorps grants, AmeriCorps*VISTA, and AmeriCorps*NCCC – our focus is only on the AmeriCorps grants program. The objectives of this effort are four-fold:

(1)   **Getting things done**- having a demonstrable effect on education, public safety, human needs, and the environment in local communities;

(2)   **Strengthening Communities** - bringing individuals of different backgrounds together in a common effort;

(3)   **Encouraging Responsibility** - enabling members to develop as leaders and problem-solvers; and

(4)   **Expanding Opportunity** - providing education awards for post-secondary education for AmeriCorps members who complete their service obligation.

These objectives are met by programs designed and proposed by non-profit organizations, federal, state and local agencies, colleges and universities, and Indian Tribes. Two-thirds of AmeriCorps grants funds are administered through State Commissions on National and Community Service; half of this amount is allocated to the individual states on a population-based formula, the other half is allocated on a competitive peer review basis.[3] The remaining one-third of the grant funds is allocated at the national level to national nonprofit organizations, programs operating across state lines, and programs supervised by federal agencies. In fiscal year 1995 $250 million were budgeted for AmeriCorps grants. Total budgeted expense of the AmeriCorps grants program in FY 1995 is approximately $395 million when the costs of post-service education awards are included.

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[3] New projects are selected by peer review; existing projects are reviewed for continued funding by staff.

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AmeriCorps grants programs operate with a combination of federal and other funds. Funded programs must raise 25% of the operating expenses and 15% of the Members' living allowances from other sources.[4] Full-time members serve for 1700 hours per year; part-time members contribute 900 hours per year. There is a two year maximum period for full-time participants. If members successfully complete their service obligation they receive an education voucher worth $4,725 per year of service ($2,363 for part-time) that can be used to pay off existing qualified student loans or to finance additional post-secondary education. Vouchers must be used within seven years.

Benefits from these programs accrue to society in three ways. First, there is a direct benefit brought about by the value of production that AmeriCorps members generate. For example, cleaning up and repairing housing to donate to the aged or the poor, as Habitat for Humanity does, clearly benefits society. Restoring a park, constructing a bicycle path, or planting trees are activities that municipal governments regularly perform and can be evaluated in the same manner that we evaluate any government activity. Similarly, teaching children mathematics, reading, and computer skills are activities that have been performed in the past in both public and private sectors.

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[4] Compensation above minimum wage level can be, and has been, paid to some participants. In this case payments in excess of 85% of the minimum wage come from non-Federal contributions.

Second, there is the benefit to individual participants. AmeriCorps members benefit in several ways. First, there is the payment for the service activity, which is a benefit to the AmeriCorps member as it would be to any worker. In addition to the living allowance, which we term wages, health insurance may be provided, and subject to a means test, child care can also be provided. Over and above these immediate rewards, there is the reward of having contributed time and effort to a worthy cause. This return is conceptually the same as the return that one gets from charitable giving. In addition, there are returns that accrue to the corps member in the future. The benefits of further education are perhaps the most obvious, but there are other, less tangible, benefits such as turning a life around, or of developing leadership potential, that accrue also.

Finally, there are benefits which, because of incomplete markets or "externalities" in their production, are not completely captured by AmeriCorps members. Examples of these benefits include the value of reducing racial tensions in a community, or generating greater respect for, and cooperation with, law enforcement agencies. A distinguishing feature of such benefits is that they are difficult to measure even where there is agreement on their presence.

Evaluating the benefits of all programs funded by AmeriCorps would be a daunting task. Instead, we have focused on three programs -- AmeriCorps for Math and Literacy, Project First, and the East Bay Conservation Corps. Each of these programs

has a distinct focus, of which we provide the following summary. In combination the three programs illustrate the range of activities that AmeriCorps members perform.

AmeriCorps for Math and Literacy

This program is a cooperative effort of the Charles A. Dana Center for Mathematics and Science Education at the University of Texas at Austin and of Reading Recovery, a program headquartered at The Ohio State University. Substantial funding from The Charles A. Dana Foundation of New York, as well as contributions by the universities, supplement funds provided by AmeriCorps. The program deploys skilled AmeriCorps members (mostly college students, majoring in mathematics or science, working part-time) into inner city and rural elementary schools. Forty AmeriCorps members were planned for the initial year, two to a classroom for a total of twenty at sites in Austin, Texas and in Columbus, Ohio. After being trained by members of Reading Recovery and the Dana Center, AmeriCorps members work with kindergarten through second grade "at risk" children to strengthen their reading, writing, and math skills. A short economic characterization of this program is that it is about technology transfer. Methods of improving human capital acquisition by at-risk youth are transmitted first to the AmeriCorps members and, through them, to the children. In addition, each participating school receives a donated technology center that includes a computer and printer for desktop publishing, a contribution of .00 in books and other materials for each classroom that is staffed with AmeriCorps members.

Project First

Providing access for public school students to computers and other modern technologies is the mai; purpose of Project First. This is a multiple site program involving the Public Education Fund Network, the International Business Machines (IBM) Corporation, and 47 schools located in three cities -- Atlanta, Charlotte, and New York. AmeriCorps teams consist of recent college graduates with technology backgrounds, who are called Technology Coordinators, and re+;·ed technology experts from IBM, who are used to supervise the Technology Coordinators. Coordinators repair and maintain technological equipment, primarily but not exclusively computers and peripherals, and assist school personnel in developing skills in using the equipment. A total of 40 full-time and 5 part-time positions were allocated for the first year. In addition to the contributions of the AmeriCorps members, IBM has donated many personal computers for use in schools and retired IBM employees have donated time to train and supervise AmeriCorps members.

East Bay Conservation Corps

AmeriCorps programs run by the East Bay Conservation Corps (EBCC) are varied and diverse, ranging from planting trees and repairing dams, to counseling teenagers and setting up teen centers, to promoting Health Through Art campaigns, immunization services, and providing nutritional counseling to the homeless.[5] At full

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[5] Loesch-Griffin (1993, 1994) describes many of these programs.

staffing the EBCC provides 46 full-time and 1 part-time position to cover Health and

Human Needs in five teams; 34 full-time positions in five teams to cover

Environmental Needs; and 38 full-time and 9 part-time positions to cover Educational

Needs. Part of this operation, involving 34.5 full time equivalent ("FTE") positions, is

comparable to AmeriCorps for Math and Literacy in that the benefits to society occur

through education; the remainder of the program is similar to the services provided

by non-profit organizations and municipalities.

III.   Measuring Benefits

We stated earlier that benefits accrue both to society as a whole and to the individual

AmeriCorps members as a result of the AmeriCorps program, and that for the three

programs described above we will ascribe both benefits and costs. Because these

programs have been in operation for so short a time it is not possible to measure the

benefits that actually accrued under the existing programs.[6] Instead, we estimate

benefits that could reasonably be expected to accrue based upon the activities of the

AmeriCorps programs. Some of these benefits are conceptually easy to measure,

and adequate data exists to do so; other benefits are conceptually easy to measure,

but no adequate database exists upon which to base an analysis. And there are

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[6] The California Conservation Corps, which was evaluated by Public/Private
Ventures (Branch et. al, 1987; Wolf et al., 1987), is not comparable with AmeriCorps
programs because it focused on residential, outdoor work as a method for turning
lives around. The programs we analyze here are more human capital oriented.

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benefits for which measurement cannot be attempted for lack of a conceptual model. In this study, we provide estimates only of benefits that are measurable and upon which there exists agreement in the research community about how to evaluate these benefits. We start first with benefits to the participants.

Benefits to AmeriCorps Members

In evaluating benefits we state them in terms of benefits received per full-time equivalent (FTE) AmeriCorps member per year.[7] We do so because it is a convenient benchmark, and also because we frequently have to use cost estimates based on budgeted expenditures rather than actual expenditures. Stating costs and benefits on a FTE basis allows us to ignore the issue of whether a particular program was able to fill its positions. Benefits received by each AmeriCorps member consist of:

(1)   a stipend (living allowance) payment;

(2)   fringe benefits that can in some cases include health care and child care;

(3)   a charitable contribution value due to performing public service; and,

(4)   the value of future education benefits received through the education voucher system.

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[7] All dollar measures are stated in constant ($1992) dollars, except where explicitly noted to the contrary. In sections IV and V below we convert to $1995.

The first two benefits are standard. The third benefit follows from the theory of equalizing wage differentials.[*] A job involving national service is a tied-sale. It pays both a wage, W_{NS}, to the worker and "sells" her a work-related benefit, C_{NS}. If that benefit is a "good" the wage will be less; if it is a "bad" it will be more. Individuals rationally choose to work in national service if:

(1) $$W_{NS} + C_{NS} \geq W^*$$

where W^* is the wage paid on the average job available to the worker. Thus the value to the worker of the non-monetary aspect of national service is

(2) $$C_{NS} \geq W^* - W_{NS}.$$

The compensating differential for this work is measured (at the minimum) by the wage differential between national service work and pay on the jobs that AmeriCorps members could have obtained. We term this benefit "Citizenship" and measure its value by the wage differential between average jobs for 18-25 year olds and the earnings of individuals who were employed in the following public service industries: (1) Job training and vocational rehabilitation services (SIC 861), (2) residential care

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[*] See Sherwin Rosen, "The Theory of Equalizing Differences," Chapter 13 in O. Ashenfelter and R. Layard, eds., **Handbook of Labor Economics**, North-Holland:Amsterda:.., 1986, p. 641-92.

facilities, without nursing (SIC 870), and (3) religious organizations (880). Using the 1992 March Annual Demographics File of the Current Population Survey we estimate the differentials by education class to be:

High School Dropout	$ 0
High School Graduate	$9,894
Some College	$4,174
College Degree	$8,642
Advanced degree	$8,642

The fourth benefit is based on the fact that investment in education has a payoff in the future. Eligible AmeriCorps members earn a voucher worth $4,725 after each year of satisfactory service, ($2,363 for a part-time year). Part of the payoff from this voucher is in enhanced earnings and part is intangible. For example, many would argue that education has current consumption value: some individuals enjoy the process of learning and benefit from the exposure education gives them to non-monetary values such as ethics, aesthetics, and so forth. These benefits are difficult to measure and we are forced to ignore them. These benefits accrue over and above the enhancements to future earnings that can be measured, and because we ignore such benefits we understate the value of the vouchers.

The education vouchers offered for national service have a special structure: they can be used (within a seven year period) for additional education, or they can be used to pay off existing post secondary loans. They are not transferrable. To the extent that vouchers are used to pay off loans for pre-existing investments in human

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capital, or that they finance additional investments in human capital that would have been made in any event, there is no investment value to the vouchers. Thus, a voucher paid to an individual who uses it to pay off a student loan counts as a transfer of $4,725 to the participant, but it generates no further benefits. In contrast, a voucher that enables an individual to obtain additional education that would not otherwise be undertaken generates an enhanced stream of future earnings, the present value of which should be attributed to the voucher. The voucher is an option that the government has sold to the AmeriCorps member. If it is not used, it produces no further investment benefits to society, but it also costs society nothing.[9]

The short span of data available does not allow calculation of the number of education voucher "options" expiring unexercised; we assume that eventually all will be exercised.[10] As noted above, the exercise of an option does not mean that AmeriCorps generated social benefits by the issuance of that option: some of the exercised options were used to pay for investments already made and some were used to pay for investments that would have been made in any event. As of March 21 of this year, 11% of service awards from the previous summer were used to pay off education loans and 89% were used to finance current education expense. Discounting future educational benefits by 11% would overstate the contribution of the

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[9] That an option expires unexercised does not mean that it did not have value; such expirations occur routinely in financial markets.

[10] Education vouchers enter both costs and benefits, so error in assuming that all will be exercised is largely offset.

program because some of the remaining 89% will finance education that would have continued in any event. Previous studies of the G.I. Bill suggest that educational vouchers increase post-secondary enrollments by 40%.[11] The education voucher available under the AmeriCorps program, however, is not as generous as was the G.I. Bill. It is available for two years, not four years, and relative to average monthly earning it is only 50% of the value of the G.I. Bill subsidy. Therefore, we evaluate its net effect as 1/4 of the G.I. Bill effect, or 10%.

Table 1 shows the present value of future labor earnings by education level. To obtain these data we computed annual earnings of full-time, full-year male workers using the Annual Demographic File of the Current Population Survey for 1992. This produced the age-earnings profile, tabulated by education level, and we reduced this to present value using the following assumptions.

(a)   Earnings from age 19 to 65 are included;

(b)   It takes two years to obtain some college, 4 years to attain
       a college degree, and 6 years to obtain an advanced
       degree;

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[11] See the staff report of the Joint Economic Committee, "A Cost-Benefit Analysis of Government Investment in Post-Secondary Education Under the World War II GI Bill," December 14, 1988; Peter J. Matilla, [1978], "G.I. Benefits and Enrollments: How Well Did Vietnam Veterans Fare?" Social Science Quarterly, 59,3:435-45; and David O'Neill, [1977], "Voucher Funding of Training Programs: Evidence from the G.I. Bill," Journal of Human Resources, 12,4:425-45.

(c)   Earnings are discounted for the probability of death[12];

(d)   Earnings are discounted for the time value of money at the
social discount rate in inflation adjusted terms of 2%[13];
and,

(e)   Earnings are discounted for labor force participation at the
combined male-female rate of 66.2%.

TABLE 1 Present Value of Future Earnings By Education Level	
Education	PV of Earnings
High School Dropout	$ 370,544
High School Graduate	$ 504,982
Some College	$ 565,363
College Graduate	$ 705,343
Advanced Degree	$ 795,065

Source: Computed from March, 1992, CPS Annual Demographics File.

We compute the value of the education vouchers in the following way. AmeriCorps

requires, and we assume that every high school dropout who enters the program

receives, a GED. Following the work of Cameron and Heckman[14] the attainment of a

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[12] We used mortality data taken from BLS Bulletin 2254, "Worklife Estimates:
Effects of Race and Education," Table A-1, 10.

[13] The 2% discount rate is the difference between inflation and the government 1-
year t-bill rate over the past 30 years. See Pindyck and Rubinfeld, [1995], Chapter 15
for a discussion of using the risk-free rate of return to discount future benefits and
costs.

[14] See Stephen V. Cameron and James J. Heckman, [1993], "The Nonequivalence
of High School Equivalents," Journal of Labor Economics, 11,1:2-47.

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GED degree leads to a 6% addition to productivity, measured by annual earnings. Further gains due to attendance in post-secondary education do not appear to generate additional increases in earnings. Also, some high school dropouts would have obtained a GED even if they had not participated in the AmeriCorps program. Cameron and Heckman [1993], Table 1, estimate this fraction to be 20.6%. Thus we assume that 79.4% of the differential accrues to AmeriCorps.

For high school graduates, those with some post-secondary training, and for college graduates the education vouchers offer the potential for increased educational attainment. As noted above, based on studies of increased education under the G.I. Bill, we estimate that educational attainment will increase by 10%. The average probabilities of attaining a higher level of education given the education level to date are shown in Table 2.

Table 2 Probability of Attaining Higher Education Conditional On Level Attained		
Conditional On HS Graduate:		
Probability of Some College		29.4%
Probability of College Degree		22.4%
Probability of Advanced Degree		9.6%
Conditional On Some College:		
Probability of College Degree		32.5%
Probability of Advanced Degree		19.7%
Conditional On College Degree:		
Probability of Advanced Degree		37.3%

Source: Calculated from March, 1992 CPS Annual Demographics File.

Combining these probabilities with the 10% increase in educational attainment yields the following returns:

High School Dropouts	$	17,647
High School Graduates	$	8,580
Some College	$	9,063
College Graduates	$	3,351

These benefits accrue in the form of increased future productivity and earnings; that is, they are over and above a stipend's direct value of $4,725. The average value of this voucher will depend upon the input mix at each site, that is, the fraction of the AmeriCorps members that are in each education category. Table 3 shows the input mix at the three projects during the first quarter of FY 1995.

TABLE 3
Distribution Of AmeriCorps Members
By Project and Education at Entry

Education Level	AmeriCorps For Math and Literacy	Project First	East Bay Conservation Corps
HS Dropout	0.00	5.00%	5.34%
HS Graduate	0.00	0.00%	34.35%
Some College	86.84	5.00%	37.40%
College Degree	5.26	70.00%	22.90%
Advanced Degree	7.89	20.00%	0.00%

Source: Computed from Operating Site Quarterly Reports.

Using these estimates of the input mix we calculate that the average value of the

future benefits due to the education vouchers is:

AmeriCorps For Math and Literacy	$ 8,047
Project First	$ 3,681
East Bay Conservation Corps	$ 8,048

Total benefits to AmeriCorps members vary by project because, as we have seen, the

value of education vouchers depends upon the input mix, as do the levels of stipends

and fringe benefits. Using data from the Operating Sites Quarterly Reports we

estimate these benefits to be as shown in Table 4.

TABLE 4
Average AmeriCorps Member Benefits
By Project
($1992)

Benefit	AmeriCorps For Math and Literacy	Project First	East Bay Conservation Corps
Wages	$ 10,868	$ 8,639	$ 8,400
Fringe Benefits	$ -	$ 1,165	$ 1,533
Citizenship	$ 4,762	$ 7,987	$ 6,939
Voucher	$ 4,725	$ 4,725	$ 4,725
Future Education	$ 8,047	$ 3,681	$ 8,048
Total	$ 28,401	$ 26,196	$ 29,644

Source: Computed from Operating Site Quarterly Reports for the individual programs.

Benefits to Society

The three programs have different aims and require separate analysis. We start with AmeriCorps For Math and Literacy.

AmeriCorps for Math and Literacy

In this case the intervention is in terms of early schoolhood exposure to mathematics and reading for "at risk" children located in Austin and Columbus. Output to society of this program consists of increased future earnings of the participants, a reduction in social costs to the extent that children covered in the program are less likely to engage in crime or other activities that adversely affect society, and the general benefits that accompany better informed citizens. Although measurement of some of these benefits is difficult we can measure the increase in earnings capacity brought

about by successful interventions. The Perry Pre-School Project, described and evaluated in Barnett [1992], provides some guidance on the issues. We first consider the benefits that accrue from this intervention based on its effects on economic earnings. In stating the gains from these interventions we estimate two levels of gains. The first level, which we refer to as "Average," assumes that individuals in the program will have the same probability of progressing from being a high school graduate to a college graduate as the average 18-25 year-old. The second level, which we call "Low," presumes that the gains in educational attainment will be of the order that was seen in the Perry Pre-School experiments (the participants in which were selected for very low measured IQ). This level, while a significant achievement for the students, is considerably lower than the average 18-25 year-old could expect to achieve. This range of alternative outcomes contains useful upper and lower limits on what the gains in achievement could be.

We start from the concept of a production function for human capital[15],

$$(2) \qquad HC = T^{\alpha} K^{\beta} F^{1-\alpha-\beta}$$

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[15] See Gary Becker, [1964], **Human Capital**, for the original idea; the role of individual and family inputs is explored in greater depth in his 1981 book, **Treatise On The Family.**

where:

HC	=	human capital earnings capacity
T	=	Teacher input
K	=	Capital input in education
F	=	input of the family, including the individual.

The AmeriCorps For Math and Literacy program is essentially an intervention that provides more teaching services, T, to students. What is important for our purposes is the magnitude of the parameter α. Labor economics implies that if labor markets for teachers are competitive that α should equal the share of teacher payments in total production. We estimated this as follows. Table 5 shows the economic returns due to differing levels of education, and the probability of attaining these levels, shown in column (3) on the assumption of average performance, and in column (4) on the assumption that the rate of educational achievement for these students will be the same as found in the Perry Pre-School Project.

TABLE 5 Earnings Gains and the Probability of Attaining Them By Education Level			
Education	PV of Earnings Gain	Average Probability	Low Probability
High School Graduate	$134,438	36.5%	29.0%
Some College	$194,820	24.9%	17.5%
College Graduate	$334,799	17.8%	15.0%
Advanced Degree	$795,065	6.5%	5.5%
Average Gain		$209,198	$167,038

Source: Computed from CPS Annual Demographics File, 1992, from data in Table 1, and from Barnett [1992].

Thus the expected gain is $209,198, averaged over all high school graduates. For the nation as a whole the average class size among elementary and high school classes was 17.2 students, and the average teacher salary was $34,100 in 1992.[16] We assume that it takes 13 years to produce a high school graduate, and we measure teacher time at the average wage. Our estimate of α is

$$(3) \qquad \alpha = \frac{\$34,100 \times 13 \text{ teachers}}{\$209,198 \times 17.2}$$

$$= 12.32\%$$

[16] Source: Teacher salary is from Table no. 245, "Public Elementary and Secondary Schools-Number and Average Salary of Classroom Teachers, 1960 to 1992, and by State, 1992," **Statistical Abstract of the United States, 1993**, p.161; average classroom size is from Table 64, "Teachers, Enrollment, and Pupil-Teacher Ratios in Public Elementary Schools, by State: Fall 1985 to Fall 1990," **Digest of Educational Statistics, 1992**, p.75.

These gains occur 13 years in the future and must be adjusted for mortality and reduced to present value. Mortality tables indicate that the probability of surviving to 19 conditional on being alive at age 6 is 98.6%. A discount rate of 2% implies that the present value of benefits received 13 years in the future is $(1/1.02)^{13} = 77.3\%$. Together, these adjustments reduce the earnings gain to $159,446 (=$209,198 x 77.3% x 98.6%). Of this amount, we attribute 12.32% to added teaching, multiplied by the four at-risk students with whom each AmeriCorps member works[17], and divided by 13 since this is one out of 13 years of education. The result is $159,446 x .1232 X 4 /13 = $6,047, which in $1995 is $6,531.

Column (4) of Table 5 contains estimates of educational achievement based on the Perry Pre-School Project. These are more pessimistic about achievement. Based on this early school intervention attainment of a high school degree was 18% more likely, and conditional on getting a high school degree, some college was 17% more likely. It is too soon to tell what the college degree and advanced degree record for these students will be, so we have estimated the differential achievement to be, conditional on attending some college, the same as the population average. Using these data

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[17] All of this program's AmeriCorps members are part-time, each of whom works principally with four "focus group" children but also with the others in the classroom (who are generally similarly "at-risk"). To be conservative we assume that one FTE member (two part-time members for a full year) is required to achieve the benchmark benefits – which alone may understate this component of societal benefit considerably – and we do not add benefits that are assuredly present for the other children. For these and other reasons stated in the text, we believe that our benefits estimates are clearly conservative.

and repeating the calculations discussed in the previous paragraphs yields a net benefit per AmeriCorps member per year of $4,828. There is minor variation if we use state-specific information on class sizes and teacher salaries for Ohio and Texas, but it is very small. Thus, for the AmeriCorps for Math and Literacy project we estimate that the annual per FTE AmeriCorps member benefit to society lies between $4,828 and $6,047. Converted into $1995 the range of benefits due to enhanced earnings is $5,215 to $6,531[18]

There are other benefits from successful intervention in early school. Barnett [1992] lists the effects of reduced crime, the reduction in education costs from having at-risk children avoid special education classes, and the reduction in welfare costs. To value these benefits in this case we assume that the incidence of these benefits proportionately will be the same as in the Perry Pre-School experiment.

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Several benefits derive from reducing crime. One is the reduced cost of incarceration. The Perry Pre-School data suggest that each at-risk student will have a 39% reduction in arrest rate, approximately one less arrest by age 19. To measure the gain to society we note that the average arrest rate in the U.S. is 7.13%, the

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[18] The Consumer Price Index-Urban was 151.4 in March of 1995 and it was 140.2 in June of 1992. We convert 1992 dollars into 1995 dollars using the multiplier 151.4/140.2=1.08.

conviction rate is 68.5%, and the imprisonment rate, given conviction, is 67.9%[19] The

average sentence is 62 months[20], and the average annual cost for a prisoner is

$13,616[21]. The present value of five years and two months of prison comes to

$66,194. Putting all this together we estimate that the gain per child is $861 ($\approx$

$66,194 x 7.13% x 67.9% x 68.5% x 39%). Because each AmeriCorps member works

with four at-risk children this results in savings of $3,444 per year.

In addition to this reduction in incarceration costs, society gains further in the assets

that are not transferred to criminals, and in the greater enjoyment of liberty because

of safer streets. In 1992 the average value of a crime against property, stated in

$1995, was $1,281[22]. Crimes other than against property do not come with a dollar

value attached to them, but we can estimate society's relative valuation by comparing

the average prison sentence for different crimes. Thus, for example, violent crimes

earned a prison sentence of 91.2 months, compared to 21.6 months for crimes

against property. Thus, we estimate the value to society of a violent crime not

committed as $5,408 (= (91.2/21.6) x $1,281). On average, each crime not

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[19] From Table 317, "Persons Arrested, by Charge, Sex, and Age," **Statistical Abstract of the US, 1994, p. 206.**

[20] From Table 334, "U.S. District Court- Offenders Convicted and Sentenced to Prison and Length of Sentence," **Statistical Abstract of the US, 1993, p. 207.**

[21] Source: Operating Expenditures per inmate computed from "Jail Expenditures, By State, 1988" **The Universal Almanac 1995,** Andrews & McMeel:Kansas City,p.249.

[22] Table 309, "Robbery and Property Crimes by Type and Selected Characteristics, 1980 to 1992," **Statistical Abstract of the US, 1994, p. 202.**

committed is worth $3,630, and since each FTE CorpsMember works with four at-risk children, we estimate the benefit as $14,520 per AmeriCorps member per year. Combined savings to society due to reduced incarceration costs and fewer crimes is $17,964.

Special education classes are expensive, and reducing the probability that a student will need to attend special education is a benefit to society. In the aggregate 10.87% of K-12 students attend special education[23]. The differential cost of a year's special education classes is, according to Barnett (1992), $6,618 in 1995 dollars. In the Perry experiment the controls group went to special education 42.9% more often, and for 1.44 years more than the experimentals group. Again, AmeriCorps members work with four children. Combining these factors yields a gain to society of $1,777 per AmeriCorps member per year ($\approx$ $6,618 x 10.87% x 42.9% x 1.44 x 4).

Costs avoided because of reduced welfare dependency also benefit society. Schiller[24] estimates that the average household on welfare receives $5,182 per year in 1995 dollars. The fraction of adults receiving benefits is 4.48%, while the fraction of adults in poverty is 13%. The Perry experiment (Barnett (1992)) indicated that welfare

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[23] Source: Table No. 256, "Children and Youth with Disabilities 3 to 21 Years Old, by Age and Educational Environment," and Table No. 243 "Public Elementary and Secondary Enrollment, by Grade," **Statistical Abstract of the US, 1993**, p. 167 and 160.

[24] Bradley Schiller, [1989], **The Economics of Poverty and Discrimination**, Prentice-Hall, New York, Table 3.4, p. 43.

receipt declined by 43.8 % (from 32 % on welfare to 18%). Multiplying these factors

together produces a per year cost saving of $52 per student, allowing for the fact that

the Perry Program was twice as long as this one. The present value of these welfare

savings over the ages 15 to 40 is $1,047. Allowing for the fact that these benefits will

occur 10 years in the future reduces the current value to $859 per pupil, and using

the four children per AmeriCorps member factor results in a total benefit in welfare

cost reduction due to the program of $3,435.[25]

Thus we estimate the total societal benefits per AmeriCorps member of AmeriCorps

for Math and Literacy to be:

	Low	Average
Enhanced Earnings	$ 5,215	$ 6,531
Reduced Crime	$ 7,647	$ 7,647
Reduced Special Ed	$ 888	$ 888
Less Welfare	$ 3,435	$ 3,435
Total	$17,185	$18,501

Project First

Project First is similar to AmeriCorps For Math and Literacy in that the benefits in the

future derive from increased education, in this case, education about the use of

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[25] This figure includes savings in direct expenditures on AFDC, food stamps and housing subsidies, but excludes both Medicaid and administrative expenses. Including these savings, which is problematic due to data shortfalls, could easily double our estimate of welfare savings.

computers. That is, we view the contribution of Project First as having three elements:

(1) donation of computers that will enable greater access and learning about computers;

(2) donation of time to support the technical maintenance of the computers; and

(3) teaching teachers how to use the equipment and software.

Donations of equipment are valued at the opportunity cost to the donor of releasing that equipment, which for the type of equipment relevant to Project First is the fair market value. Donations of time by retired IBM employees are also valued at their opportunity cost. The contribution of the working computers to the education of children is more subtle.

Our measurement uses the production function approach described above. Economic research has shown that workers who use computers on their job are 10-15% more productive, but that computer usage varies with education level.[26] Table 6, column (2) shows the earnings gains attributable to increased computer usage, while column (3) shows the probability that a worker with that level of education will use a

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[26]See Alan B. Krueger, [1993], "How Computers Have Changed the Wage Structure: Evidence From Microdata; 1984-1989," **Quarterly Journal of Economics,** 108, p. 33-60; and Kevin T. Reilly, [1995], "Human Capital and Information," **Journal of Human Resources,** 30,1:1-18.

computer on the job. Columns (4) and (5) show the marginal distribution of education attainment, with column (4) containing the distribution assuming that the children have the same results as the average, while column (5) assumes that they have the same results as in the Perry Pre-School Project.

Education Level	Earnings Gain	Probability of Using Computer on A Job	% with Education Level (Avg.)	% with Education Level (Low)
HS Dropout	$ 37,054	7.31%	14.2%	33.0%
HS Graduate	$ 50,498	27.93%	36.5%	29.0%
Some College	$ 56,356	44.44%	24.9%	17.5%
College Graduate	$ 70,534	57.60%	17.8%	15.0
Advanced Degree	$ 79,507	58.03%	6.5%	5.5%
Expected Gain			$22,045	$18,013

Table 6
Present Value of Earnings Gains
Due to Computer Usage
By Education Level

Source: Computed from data in the March, 1992 Annual Demographic File; Table 408 of the Digest of Educational Statistics, 1992; and Table V of Krueger (1993).

The last row in Table 6 contains the estimated gain to increased computer usage. We estimate that it ranges from $18,013 to $22,045. Multiplying these gains by 98.6% to allow for mortality, and by $(1/1.02)^{13}$ to reflect that the benefits are deferred an average of 13 years into the future, yields benefits of $ 13,736 to $ 16,810 per student. Not all of this gain can be attributed to Project First, however. We need to

adjust for the share of teacher services in human capital production, and we must calculate the number of students per school that will be affected.

Adjusting for the teacher's share, by multiplying by 12.32%, yields gains of $1,692 to $2,071 per extra student produced with computer skills. To calculate the number of students affected we assume that the services of the AmeriCorps member combined with donated equipment results in 5 additional computers being available. Since the average computer is used 20 hours per week,[27] this results in 100 additional hours per week per school. Average school size (elementary and secondary) in the nation is 487[28]. After 13 years of education the typical student in these schools will have 96 more hours of computer instruction, 557 versus 461.

The overall fraction of individuals who use computers at work is 36%.[29] Krueger [1993] estimates that 62% of workers with computer training received it from their employers or from a training firm.[30] A linear relation between hours of computer usage in schools and the probability of working with computers at the workplace yields

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[27] Table 253, "Instructional Use of Computers In Elementary and Secondary Schools, 1985 and 1989, and by Level, 1989," **Statistical Abstract of the United States, 1993,** 165.

[28] Table 240, "Public Elementary and Secondary Schools, By Type and Size of School: 1990-91," **Statistical Abstract of the United States, 1993,** p.158.

[29] Table 408, **Digest of Education Statistics,** op. cit.

[30] Krueger, op. cit., p. 46.

(4) $$\text{Prob (Work with Computers)} = 0.223 + .00029 \times \text{Hours}$$

Therefore, the additional computer time brought about by Project first will result in 13.6 extra students with computer skills per school ($487 \times 96 \times .00029 = 13.6$). Total benefits per school range from \$22,967 ($\approx$ \$1,692 $\times$ 13.6) to \$ 28,108 ($\approx$ \$2,071 $\times$ 13.6) There are two AmeriCorps members per school so to put these benefits on an annual AmeriCorps member basis we divide by 2, obtaining \$11,483 and \$14,054. Total benefits per AmeriCorps member, in 1995 dollars, are \$12,402 to \$15,178.

The less tangible and measurable benefits are calculated for Project First in the same manner that we used for AmeriCorps for Math and Literacy. We calculate an additional effect of \$1,856 per AmeriCorps member per year for reduced welfare expenditures, no discernible effect on the incidence of special education, and a savings of \$1,409 due to reduced crime by students in the schools. Thus total benefits per AmeriCorps member per year, in 1995 dollars, are estimated to range from \$15,667 to \$18,443.

East Bay Conservation Corps

Of the 125 FTE AmeriCorps members involved in EBCC, 34.5 (30 full time and 9 part time) are directly involved in educational service. These volunteers do a variety of tasks that are similar to the educational services provided by the AmeriCorps for Math and Literacy program. To calculate the value of these services we use an algorithm that is similar to the one we used for the AmeriCorps for Math and Literacy program. The remainder of the EBCC AmeriCorps members perform diverse services that resemble a small municipal government. Indeed, several of the sponsors are offices of county or municipal agencies in the East Bay area. We discuss the evaluation of these projects below.

Nine full time volunteers and one part time volunteer serve at-risk students in Berkeley High School, or Berkeley Youth Alternatives, or participate in Project YES (Youth Engaged in Service). The latter provide educational services for Oakland Unified School District and work with 290 at-risk students, primarily in roles that resemble teacher's aides.[31] We estimate the share of teacher's aides in production of human capital as 4.59% using the methods and sources cited above. The benefits for these individuals are difficult to measure, but there is reason to believe that AmeriCorps members will have an impact on the lives of these students. However, it is unlikely that they will perform as well as the average student. We expect that the primary

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[31] Source: East Bay Conservation Corps Second Quarter Report. Of these students, 270 are still in school and 20 have dropped out. CorpsMembers work with both groups.

value of the services of these AmeriCorps members will be in fostering the attainment of a GED among the at-risk students. Following Cameron and Heckman [1993, p.9] we estimate that a program such as this could increase the GED pass rate by 14% (10%/70%). The average gain for earning a GED is $22,233 ($1992) per individual. We treat the average student as being 3 years from attaining his or her GED; we discount for mortality between ages 16 to age 19 (99.31% survive); we measure the productive input of the AmeriCorps members by multiplying by alpha divided by three years (4.59%/3); and we allow for discounting ($(1/1.02)^3 = 94.23\%$). There are 30.5 at-risk students per AmeriCorps member, 20.6% [Cameron and Heckman (1993)] of whom would have earned a GED in any event. Combining all these factors yields a net gain per AmeriCorps member of $1,389, which converted to 1995 dollars is $1,500.

Twelve EBCC AmeriCorps members, 8 full time and 4 part time, work with at-risk junior high school students. They deal with from 5 to 12 students apiece; we assume an average of 8 students per AmeriCorps member. As we did with AmeriCorps for Math and Literacy, we estimate average lifetime earnings gains due to intervention as between $209,198 and $167,038. We assume that the average child is in 7th grade. We again measure the productive input of the volunteers by multiplying by alpha divided by thirteen years $(4.59\%/13)^{32}$; we discount for mortality between ages 13 to

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[32] Unlike the preparation for a GED, these programs more closely resemble the early intervention programs where each year of education is one of thirteen needed to get the child beyond high school.

age 19 (98.9% survive); and we allow for discounting $((1/1.02)^6 = 88.8\%)$. Combining all these factors yields a net gain per AmeriCorps member of $5,194 ($4,479 as the low estimate), which in 1995 dollars is $5,609 ($4,479 as the low estimate).

In addition there are 17 AmeriCorps members, 13 full time and 4 part time, who work with at-risk K-6 students. These volunteers provide a variety of educational services similar to the work performed by teacher's aides. We assume that 70 at-risk children receive educational enrichment from the volunteers. As we did with AmeriCorps for Math and Literacy, we estimate average lifetime earnings gains due to intervention as between $209,198 and $167,038. We assume that the average child is in 3rd grade. We again measure the productive input of the volunteers by multiplying by alpha divided by thirteen years (4.59%/13); we discount for mortality between ages 9 to age 19 (98.8% survive); and we allow for discounting $((1/1.02)^{10} = 82.0\%)$. Combining all these factors yields a net gain per AmeriCorps member of $2,795 ($2,232 as the low estimate), which in 1995 dollars is $3,019 ($2,410 as the low estimate).

The average of earnings gains for these three programs ranges from a high of $3,351 to a low of $2,759 per AmeriCorps member per year.

As in the previous two programs benefits accrue to society because some of these at-risk youth will have their lives changed and be less likely to go on welfare or to commit crimes. We calculate the gains arising from reductions in crime, lower special

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education costs, and smaller welfare expenses in the same manner as we did for the AmeriCorps for Math and Literacy pioject. The only difference is that EBCC deals with youths in varying age ranges and education levels. For example some children are in K-6, others are high school dropouts. We estimate these gains to be, per FTE AmeriCorps member: $1,399 for reduced incarceration and crime costs, $988 for reduced special education costs, and $3,713 for reduced welfare costs. Total benefits from the educational component of the EBCC AmeriCorps project (expressed per FTE volunteer) are:

	Average	Low
Enhanced Earnings	$3,351	$2,759
Reduced Crime	$1,399	$1,399
Reduced Special Education	$ 988	$ 988
Lower Welfare Expense	$3,713	$3,713
Total	$9,451	$8,859

The other 90.5 (= 125 - 34.5) EBCC AmeriCorps members perform diverse tasks that resemble those performed by municipal governments. This suggests that the appropriate way to evaluate this part of the EBCC program is through the consumer surplus it generates.[33] The urban economics literature suggests that the demand for municipally-provided public goods has a price elasticity in the range of -.5 (Education, Health) to -1.33 (Public Welfare).[34] To calculate consumer surplus we use a "high"

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[33] See Robert S. Pindyck and Daniel L. Rubinfeld, [1995], **Microeconomics**, 3rd edition, Prentice-Hall, p.116-8, for a discussion of using consumer surplus to measure the value of public goods.

[34] Demand elasticities are surveyed and summarized in Robert P. Inman, "Fiscal Performance of Local Governments: An Interpretative Review" in P. Mieszkowski and

demand elasticity of -0.74, which was the average surveyed by Inman, and a "low"

elasticity of -.5. We note that 1992 municipal general expenditures in Oakland,

California were $508 dollars.[35] Evaluating this at the price (P) = 1 yields the inverse

demand curve of

(5) $P = 2.3514 - .0024631 \times Q$

where P is measured in dollars and Q is measured in millions of 1995 dollars. The

federal part of the EBCC budget is 1.62 million 1995 dollars[36]. However, not all of the

$1.62 million results in increased municipal expenditure due to fiscal substitution.

That is, some resources are diverted to other uses. Inman (1979) estimates that the

matching fund obligation elasticity is 22%. Thus, an increase of $100 results in $22

dollars of new spending for municipal services. The remainder is used in other

projects or for local tax reduction. Using this estimate of the fiscal substitution effect

we estimate the gain in consumer surplus to be $5,750 ($1995) per full-time

AmeriCorps member. To appreciate the sensitivity of the estimate to the elasticity

chosen, note that if the price elasticity of demand were raised to -.5, indicating that

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M. Straszheim, eds., [1979], **Current Issues In Urban Economics**, Johns Hopkins
University Press.

[35] Table 492, "City Governments- Expenditures for Largest Cities: 1992", **Statistical
Abstract of the United States, 1994, p.** 318.

[36] EBCC's federal budget was $2.24 million in 1995. We allocated (90.5/125)x2.24
million = $1.62 million to these programs based on the share of total CorpsMembers
involved,

the services provided by the AmeriCorps members were in a sense more essential, the estimate would be $8,519.

IV. Measuring Costs.

It normally is the case that costs are the easier item to measure in studies such as this. The nature of AmeriCorps programs, in particular the sharing requirement for sponsors, makes it difficult to measure costs attributable to the AmeriCorps program per se. The CNS statute requires that at least 25% of program operating costs be matched by the grantee organizations, with at least 15% of participant support costs being met in cash. The difficulty that arises is how to measure the value of the 25% match, which often comes in donated services.

The economic value of the matching costs may not be the same as the accounting value that participants ascribe to them for at least four reasons. First, accounting values do not always reflect opportunity costs, and it is the latter that are appropriate for benefit-cost analysis. Second, donors may overstate the value of their contributions. Third, a program in its start-up phase may incur costs that will not be repeated. And, fourth, the contributions may reflect, in whole or in part, a contribution to a joint project that is distinct from the AmeriCorps program, and whose benefits have not been counted. For example, a university may contribute the time and effort of scholars because studying a program like AmeriCorps is an appropriate activity of a university. Similarly, a for-profit corporation may make donations of its products to

a program because of the marketing cachet that the association may bring to the corporation. But in neither case is the value or benefit of these activities ascribed to the program, altho gh the costs would be.

The potential size of the overstatement can be seen by looking at the ratio of matched funds to total funds across the three projects. At the East Bay Conservation Corps grantee funds are 19% of the total; at Project First they are 33%, and at AineriCorps for Math and Literacy they are 35%. Because the privately sponsored programs involve such a large contribution there is a suspicion that these cost estimates should be discounted. It is beyond the scope of this analysis to disentangle the appropriate social costs of matching funds, although clearly this should be a goal for the future. Instead, we provide estimates of per AmeriCorps member costs based on including matched funds valued at 100% and at a maximum of 25% of reported total costs. (A further discussion of donor costs and benefits is set forth below)

Table 7 shows the cost per full-time AmeriCorps member in each of the programs.

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TABLE 7

Federal and Donor Costs of FTE AmeriCorps Member

Costs:	EBCC			AmeriCorps For Math and Literacy			Project First		
	Federal	Grantee	Total	Federal	Grantee	Total	Federal	Grantee	Total
Stipends	$6,908	$1,492	$8,400	$7,468	$3,999	$11,467	$7,215	$1,424	$8,639
Health Care	$ 592	$ 105	$ 697	$ 0	$ 0	$ 0	$ 960	$ 169	$1,129
Child Care	$ 836	$ 0	$ 836	$ 0	$ 0	$ 0	$ 36	$ 0	$ 36
Education Ben.	$4,725	$ 0	$4,725	$4,725	$ 0	$ 4,725	$4,725	$ 0	$4,725
Overhead Costs:									
Support Costs	$ 628	$ 891	$1,520	$ 790	$ 1,047	$ 1,837	$ 808	$3,553	$4,361
Staff Expense	$5,792	$ 691	$6,483	$1,901	$ 4,362	$ 6,263	$4,211	$1,351	$5,562
Operation Exp.	$2,117	$ 40	$2,157	$2,165	$ 2,651	$ 4,816	$1,814	$2,878	$4,692
Evaluation	$ 192	$ 224	$ 416	$ 600	$ 0	$ 600	$ 206	$ 400	$ 606
Administration	$ 854	$1,770	$2,624	$ 516	$ 477	$ 993	$ 750	$ 574	$1,324
Total:	$22,645	$ 5,213	$27,858	$18,165	$12,536	$30,701	$20,725	$10,350	$31,075
Total @ 25% Grantee Match	$22,645	$ 5,213	$27,858	$18,165	$ 6,055	$24,220	$20,725	$ 6,908	$27,633

Source: CNS contract with the respective grantee organization. AmeriCorps for Math and Literacy figures are adjusted to reflect the particulars of its program structure.

V. Benefit-Cost Ratios

We have measured per AmeriCorps member benefits and costs for each of the three programs and so a comparison of the two is now possible. But before proceeding to this comparison it is useful to consider what the relevant range, or magnitudes, of the benefit-cost ratios are likely to be.

As economists we have attempted to measure marginal benefits and marginal costs of these programs, reflecting actual resource usage. For example, we measured only part of the education voucher as a gain to society, reflecting the fact that some of the vouchers would be used to pay off student loans and not generate additional investment. In proceeding in this manner we have, we believe, adhered closely to the

spirit of scientific analysis. But as discussed earlier, policy analysis, especially in the

social welfare arena, sometimes contains claims of benefit-cost ratios of 10, 15, or

even 100 to 1![37] Unfortunately numbers as high as these appeal to the press and the

publicity they receive tends to make more scientifically based numbers look low. It is

as though these discussions are afflicted by a kind of Gresham's Law of Language:

Bad talk drives out good.

As an example of the range of economic cost benefit ratios that might be found in

practice, consider taking $100 and putting it into a long-term project that pays a 10%

real rate of return (i.e., in excess of inflation) compounded each year over ten years.

Ten years is chosen as an appropriate duration for comparison to AmeriCorps

projects. The 10% real return that this project pays is well above the average real

return earned on U.S. corporate stocks or bonds over the past 30 years. At the end

of ten years this asset will be worth $260 (in real terms), so it will pay out 1.60 dollars

for every dollar invested. Its ratio of benefit to cost, when allowance is made for 2%

per year discounting, is 216%. A 10% real return over ten years is clearly a highly

productive project.[38] This example reveals why the benefit-cost ratios we find for the

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[37] See U.S. House of Representatives, Select Committee on Children, Youth and Families, [1990], "Opportunities for Success: Cost-effective Programs for Children Update: 1990," for a litany of such claims.

[38] On May 19 the prime rate, reflecting the cost of funds to the most-creditworthy corporations, stood at 9%, while telephone bonds paid 7.83%. With an annual inflation rate of 2.5-3%, these returns are approximately 4.8 to 6.5% in real terms.

subject projects -- in the range of 160% - 260% -- are significant from a scientific economic viewpoint.

Having noted the relevant magnitudes of benefit-cost ratios, there are several ways to compare costs and benefits, each of which has its adherents. One of the more popular comparisons looks at undiscounted dollars of benefits per dollar of federal funds used. On this basis the three programs examined here generate between $2.2 to $4.7 per federal dollar used. That is, the payback ratio ranges from 2.2 to 4.7, indicating a substantial flow of benefits per dollar outlay.

Economists find it technically more useful to look at benefit and cost flows with allowance being made for the time value of money, that is, with allowance made for the fact that costs may be incurred now while some of the benefits will occur in the future. In Tables 8 a and b we consolidate estimates of benefits and cost of these AmeriCorps programs expressed per FTE member. Table 8a contains benefit estimates based on average success rates in social programs, while Table 8b uses benefit estimates based on lower success rates.

Table 8a

Benefit-Cost Ratios For Three AmeriCorps Programs: Upper Range

	EBCC	AmeriCorps For Math and Literacy	Project First
Total Net Benefits = Net Benefits to Society + Net Benefits to Donors (0) + Net Benefits to AmeriCorps Member	$37,963	$46,903	$44,639
Federal Expenditures	$22,645	$18,165	$20,725
Benefit-Cost Ratio	168%	258%	215%

Table 8b

Benefit-Cost Ratios For Three AmeriCorps Programs: Lower Range

	EBCC	AmeriCorps For Math and Literacy	Project First
Total Net Benefits = Net Benefits to Society + Net Benefits to Donors (0) + Net Benefits to AmeriCorps Member	$35,948	$45,587	$41,863
Federal Expenditures	$22,645	$18,165	$20,725
Benefit-Cost Ratio	159%	251%	202%

The benefit-cost ratio that we present calculates the present value of the aggregate net expected benefits accruing to society, to the individual AmeriCorps members and to the donors relative to the costs in terms of the present value of federal dollars expended. The present value of the net benefits to the individual and to society are measured as in Section II. To measure the net benefits to the donors we apply the

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following analysis. Since the donors' in-kind and other contributions are voluntary, we can assume that their expected benefits are at least equal to the costs of their contributions, however they are measured. Because it is difficult to measure donor benefits directly, to be conservative we simply assume that donors' net benefits are zero. Thus the appropriate conservative benefit-cost comparison is the ratio of the present value of aggregate net benefits accruing to individual AmeriCorps members and to society relative to the present value of the corresponding total federal expenditures.

These results are summarized and presented in Tables 8a and 8b (which differ as discussed earlier). In both Tables, the benefit cost ratio is show in the bottom row. The ratio across the three programs, on either assumption about success rates in social programs, varies between 160% and 260%. That is, we have measured benefits to be $1.60 to $2.60 per dollar of federal outlay and, as we discussed earlier, these measured benefits, by the nature of the methodology, are understated.

It should be noted that there are alternative benefit-cost ratios that can be calculated in principle and that are conceptually equivalent to those presented in Table 8. For example, one could aggregate the cost of donor contributions with the federal spending and include a donor benefit equal to the donor contribution cost in the benefit numerator. By construction, adding the same dollar amount to the numerator and denominator will affect the benefit-cost ratio even though it does not affect the

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overall net benefit delivered by the programs. These alternate benefit-cost ratios would range between 150% and 220%, slightly lower than those of Table 8 but the analytical equivalent.

VI. Summary and Conclusions.

This study has applied the principles of benefit-cost analysis to prototype grants programs of AmeriCorps. We have provided a methodology for appraising the benefits of such programs and we have applied the methodology to the particular facts and figures for these three programs. Other AmeriCorps programs can use these results and the reference sources as a template for their own evaluations.

In this study, as in all such studies, there are uncertainties about future benefits and there are uncertainties about current costs. We have attempted to deal with these uncertainties by presenting a range of estimates of benefit-cost ratios that take into account reasonable values for the uncertain items. We also have attempted to quantify where possible the value of benefits that are not strictly economic. For example, we have used existing, accepted data to assess the reduction in crime by the lower cost of criminal imprisonment and by the imputed value of the societal gain when crime is reduced. More generally, there are many amenities of modern life that would be enhanced by less social misbehavior, although we are uncertain about their

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exact value. Despite these uncertainties the benefit-cost ratios we estimate exceed 1 by a substantial margin. This suggests that programs of this sort generally can be an important societal investment, even on the narrow, mainly economic, grounds that we have considered.

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Financial Management Network, "The Thrift Industry Crisis," 1990.

Banking and Financial Services Executive Program, University of Michigan, "Public Policy Towards Financial Services" and "Macroeconomic Data Analysis," 1987.

Public Finance Institute, University of Michigan, "Financial Market Theory" and "Macroeconomic Data Analysis," 1986-1987.

Executive M.B.A. Program, University of Chicago, "Business Fluctuations," 1982-85.

Republic Steel Executive Seminar, "Microeconomics for Manufacturing Managers," 1983.

McCann-Erickson Executive Seminar, "Microeconomics for Marketing Managers," 1980-81.

ASSOCIATIONS

American Economic Association
American Statistical Association
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Curriculum Vitae

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education

1964-68	LE MOYNE COLLEGE
	B.A. (Economics); degree awarded June 1968
1968-69	NORTHWESTERN UNIVERSITY
	M.A. (Economics); degree awarded June 1969
1969-74	N. TERN UNIVERSITY
	Ph.D. (Economics); degree awarded September 1974

professional
experience

1972-75	Assistant Professor, Department of Economics, The Pennsylvania State University
1975-79	Assistant Professor, Graduate School of Business, University of Chicago
1979-84	Associate Professor, Graduate School of Business, University of Chicago
1980-	Research Associate, Economics Research Center National Opinion Research Center
1980-81	Visiting Associate Professor of Labor Economics, New York State School of Labor and Industrial Relations, Cornell University
1982-84	Visiting Associate Professor, Department of Economics,

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Northwestern University

1983	Visiting Research Professor, Aarhus University, Denmark
1984-	Professor of Economics and of Industrial Relations, University of Iowa
1992-	Professor of Applied Mathematical Sciences, the University of Iowa
1987-90	Chairman, Department of Economics, University of Iowa
1990-91	Visiting Professor of Economics, Princeton University
doctoral dissertation	Wage inflation in U.S. Industries: 1957-1969 An Empirical Study
fields of research	Labor Economics, Search Theory, Applied Econometrics, Economics of Discrimination
books	Studies In Labor Market Dynamics Springer-Verlag, Heidelberg (1984), x + 285 pp. (with N. Westergaard-Nielsen)
	Search Theory and Applied Labor Economics, Cambridge University Press, Cambridge, U.K. and New York, 1988, ix + 292 pp. + index. (with N. M. Kiefer)
	Predicting Presidential Elections: Polls, Markets Models, University of Michigan Press, (forthcoming, 1995) (with R. Forsythe, F. Nelson, and J. Wright).
publications (books and articles) in professional journals)	"The Direct Labor Market Effects of the Trade Adjustment Assistant Program: The Evidence from the TAA Survey," pp. 100-122 In W.G. Dewald, ed., The Impact of International Trade and Investment on Employment (1978).

"The Labor Market Adjustments of Trade Displaced Workers: The Evidence from the Trade Adjustment Assistance Survey," Research in Labor Economics 2 (1978): 353-81.

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and Steel Investment Behavior," Review of Economics
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Case of Strikes," Journal of Political Economy, Vol.
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from the Stock Market," The Industrial and Labor
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535.

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(with Jon P. Nelson) "Tax Policy and Steel Industry
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Effects of the Coal Mine Health and Safety Act of
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U.S. Manufacturing: How Large Are the Losses?"
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(with Ellen Rissman) "Where Have All The Union Members
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States as Natural Rates in a Dynamic Discrete Choice
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of Discrimination in Terminations, Layoffs, and
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Annual Meeting of the Industrial Relations Research
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of Unemployment?: Illusions and Biases in the Use of
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Censored Regression Models: Parametric Methods,"
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Parametric Methods," <u>Journal of Applied Econometrics</u>,
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"Long-run International Trends in Aggregate
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                 Growth, in Industrial and Labor Relations Review, 44
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                 Robert J. Flanagan, Karl O. Moene, and Michael
                 Wallerstein, Trade Union Behaviour, Pay-Bargaining,
                 and Economic Performance, in Journal of Economic
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other   (with Elchanan Cohn, Jon P. Nelson, Morgan V. Lewis,
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                 The Pennsylvania State University (1975):   333 + xx.

                 Investment Behavior in the U.S. Iron and Steel
                 Industry: Forecasts for 1975: 1980, Institute for
                 Research on Human Resources, The Pennsylvania State
                 University (1975):   102 + x.

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                 Partial Benefit Formulas on Beneficiary Part-Time work
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                 Labor, Employment and Training Administration, 1978.

                 An Evaluation of the Trade Adjustment Assistance
                 Program report submitted to the U.S. Department of
                 Labor, Bureau of International Affairs, 1978.

                 "Labor Market Trends and Institutions," Chapter 11 in
                 Oppenheim, Appel, Dixon and Co., Doing Business in the
                 United States.

                 (with Jon P. Nelson) "Tax Policy, Capital 'Shortages,'
                 and Iron and Steel Investment Behavior," Proceedings
                 of the Steel Industry Economic Seminar. University of
                 Washington (June 1979):   43-63.

professional   Associate Editor, Journal of Labor Economics, 1982-90.
associations

                 Member, American Economic Association, American
                 Statistical Association, Econometric Society,
                 Industrial Relations Research Association,

Mathematical association of America

Referee for: American Economic Review, Econometric
Theory, Econometrica, Economic Inquiry, Industrial and
Labor Relations Review, International Economic Review,
Journal of Business, Journal of the American
Statistical Association, Journal of Business and
Economic Statistics, Journal of Econometrics, Journal
of Environmental Economics and Management, Journal of
Law and Economics, Journal of Legal Studies, Journal
of Political Economy, Quarterly Journal of Economics,
Quarterly Review of Economics and Business,
Scandanavian Journal of Economics.

Consult_nt to: U.S. Department of Labor (1975 -),
U.S. Department of the Interior (1974-76), National
Science Foundation (1974-75), Executive Office of the
President: Council on Wages and Price Stability
(1975-76), Ontario Economic Council (1979-81), Iowa
State Commerce Commission (1980-2), National
Commission on Employment Policy (1980-2), Federal
Trade Commission (1983-88).

Board of Directors, Internet Corporation (1989 -93)

Fellowship & Grant Committee, Hoover Presidential
Library (1990-92)

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education

    College of William and Mary,   S.B. (Mathematics & Economics), 1981
    University of Chicago,   A.M., 1983, Ph.D. 1988

    dissertation: *Fertility, Human Capital and the "Wealth of Nations"*

teaching experience

    Undergrad.:   Intermediate Price Theory, International Economics, Economic Analysis of Labor Markets, Math for Economists

    Graduate: *MBA*: Price Theory, Macroeconomics
                   Ph.D.: Growth Theory

professional experience

    Assistant Professor of Economics at the University of Iowa, 1988-

    Research Fellow National Bureau of Economic Research, 1989-1993

    Referee for:

American Economic Review	*Journal of Labor Economics*
Canada Council	*Journal of Macroeconomics*
Economica	*Journal of Monetary Economics*
Economic Inquiry	*Journal of Political Economy*
Economic Journal	*Journal of Public Economics*
International Economic Review	*National Science Foundation*
Journal of Business and	*Oxford Economic Papers*
Economic Statistics	*Quarterly Journal of Economics*
Journal of Development Economics	*Review of Economic Statistics*
Journal of Economic Theory	*Scandanavian Journal of Economics*
Journal of International Trade	*Southern Economic Journal*
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    member: American Economics Association, Econometric Society

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honors and fellowships

Hoover Institution, Stanford University: John Stauffer National Fellow of Public Policy: 1993-1994

University of Iowa: Old Gold Summer Fellowship: 1989, 1990, 1991
College Summer Research Grant: 1990, 1991, 1992, 1993, 1994

University of Chicago: Robert F. Tamura Award created by Department of Economics, 1987

College of William and Mary: ΦBK, 1980; Highest Honors (Economics), 1981

publications

"Economic Growth, Population Growth and Human Capital," (with Gary S. Becker & Kevin M. Murphy) *Journal of Political Economy*, 98, (October 1990): S12-S37.
(reprinted in Becker, Gary S. *Human Capital*, Third Edition 1993.)

"Income Convergence in an Endogenous Growth Model," *Journal of Political Economy*, 99, (June 1991): 522-540.

"Efficient Equilibrium Convergence: Heterogeneity and Growth," *Journal of Economic Theory* 58, (December 1992): 355-376.

"Fertility, Human Capital and the Wealth of Families," *Economic Theory*, 4, 1994: 593-603.

working papers

"From Decay to Growth: A Dynamic Equilibrium Model of Income Distribution," December 1994, presented at the *Society for Economic Dynamics and Control* and 6th *World Congress of the Econometrics Society*, under second review at *Journal of Economic Dynamics and Control*.

"Competitive Balance in Professional Sports: The National Football League," 1993 (with George Neumann).

"Stochastic Growth of Quality and Quantity," January 1994, under review at *Journal of Economic Growth*.

"Investment Specialization, Fertility and Growth," May 1994 (with Kevin Murphy).

"Regional Economies and Market Integration," November 1994, under second review at the *Journal of Economic Dynamics and Control*.

"Allocation of Talent, Teachers and Growth," September 1994, presented at the *Society for Economic Dynamics and Control*.

"An Economics of Language," November 1994.

invited presentations

1988:   Summer Meetings of the Econometric Society: Minneapolis, Minnesota.
1989:   University of California: Santa Barbara,

RAND Corporation.
1990: Summer Meetings of the Society for Economic Dynamics and Control: Minneapolis, Minnesota,
Northwestern University Summer Institute,
6th World Congress of the Econometrics Society: Barcelona, Spain,
University of Western Ontario,
Rice University.
1991: University of Chicago,
Iowa State University,
College of William and Mary.
1992: M.I.T.,
Summer Meetings of the Society for Economic Dynamics and Control: Montreal, Canada,
N.Y.U.,
Philadelphia Fed,
University of Wisconsin.
1993: Boston University,
Brown University,
Hoover Institution,
Stanford University.
1994: University of California: Berkeley,
University of California: Los Angeles,
University of California: Santa Barbara,
University of California: San Diego,
Federal Reserve Bank of San Francisco,
Hoover Institution,
Summer Meetings of the Society for Economic Dynamics and Control: UCLA.
University of Chicago

research in progress

"Managerial Inputs: NFL, ML Baseball and NBA," (with Kevin Murphy, George Neumann)
"Location of Capital Cities," (with Ed Glaeser)
"The Organization of Economics Departments," (with James Montgomery)
"Movies: The Role of Actors, Directors, Distributors, Producers and Writers,"
"Education and Economic Growth," (with Brooks Pierce)
"Growth, Fertility and Human Capital, prepared for Handbook in Economic Dynamics, Michele Boldrin and Manuel Santos, editors.

other publications

"Human Capital, Fertility and Economic Growth," Chapter in forthcoming 1995 volume in honor of Gary S. Becker

"The Case for Convergence," (with Ray Riezman, Charles Whiteman) in *Proceedings of the American Statistical Association*, 1994.

PROFESSIONAL BIOGRAPHY

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EDUCATION

A.B. (Economics), California State University, 1970
M.A. (Economics), University of California, Los Angeles, 1972
J.D., University of Chicago Law School, 1978

EMPLOYMENT

Consulting Economist   1991 - Present

Prepared expert testimony for federal litigation against owners, accountants and attorneys of large failed S&L. Co-directed the team of Kormendi \ Gardner principals as Resolution Trust Corporation's financial advisors. Designed, negotiated, documented and implemented restructuring of largest FSLIC bailouts of failed savings and loan institutions; designed and supervised due diligence and valuation for multi-billion dollar troubled asset portfolios; and designed the oversight, monitoring and supervision interface for RTC bulk portfolio transactions. On behalf of a New York money center bank, designed an integrated model of loan valuation, risk assessment, multi-scenario collateral valuation and borrower liquidity.

Private Law Practice   1978-1991

Business practice with emphasis upon economics issues in complex commercial, antitrust, securities and real property disputes. Trial and appellate practice in federal, state and bankruptcy courts. Representative clients: Trammel Crow Companies, E.I. du Pont de Nemours and Company, The Watt Companies.

Economist   1972-1978

Consulting and teaching assignments specializing in economic analysis of securities issuance, trading and exchanges. Representative clients: The RAND Corporation, Memorex Corporation, Computer Industry Association.

PROFESSIONAL MEMBERSHIPS

Bars of the State of California, 1978; District of Columbia, 1989; State of Maryland, 1991.